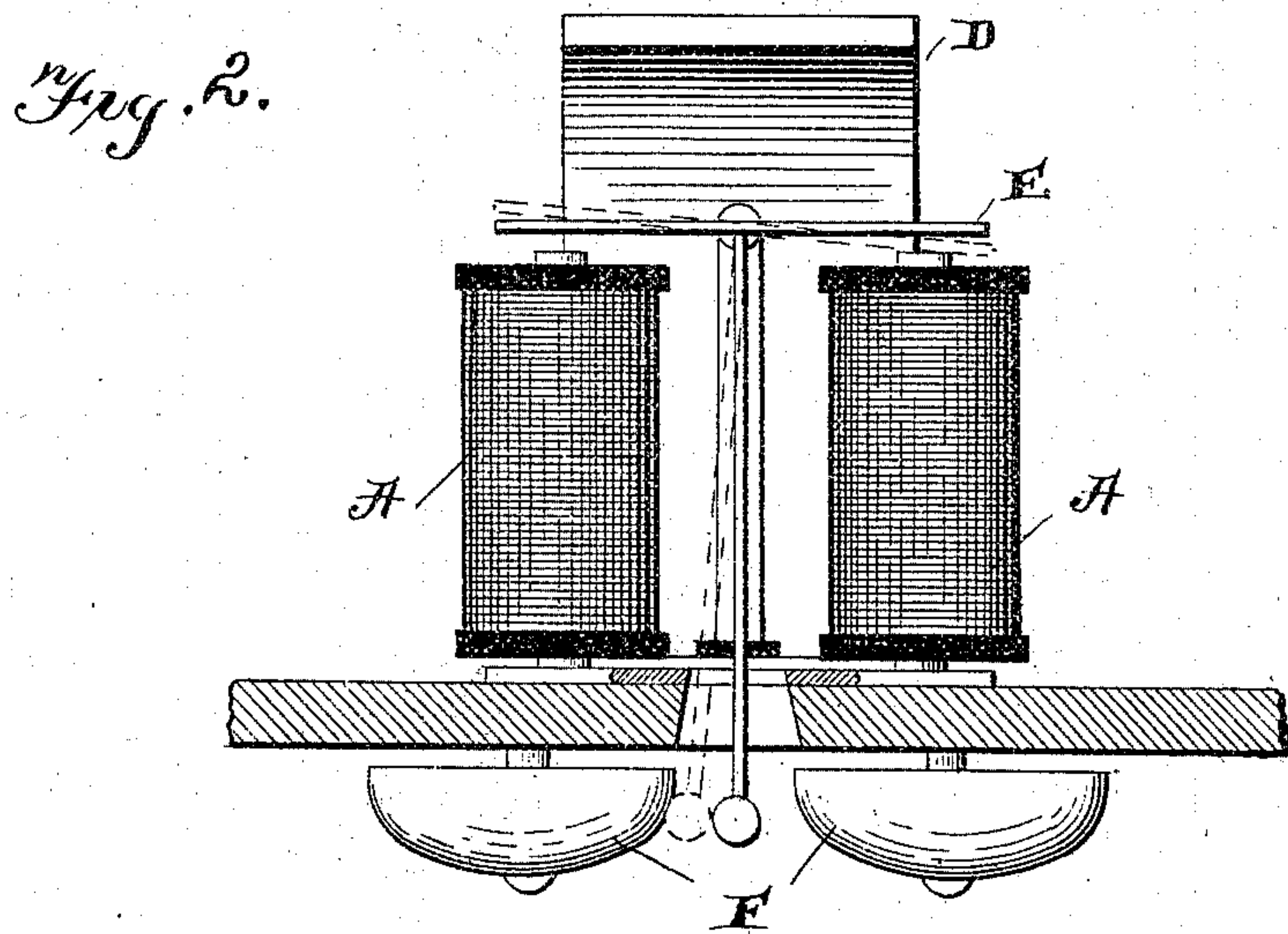
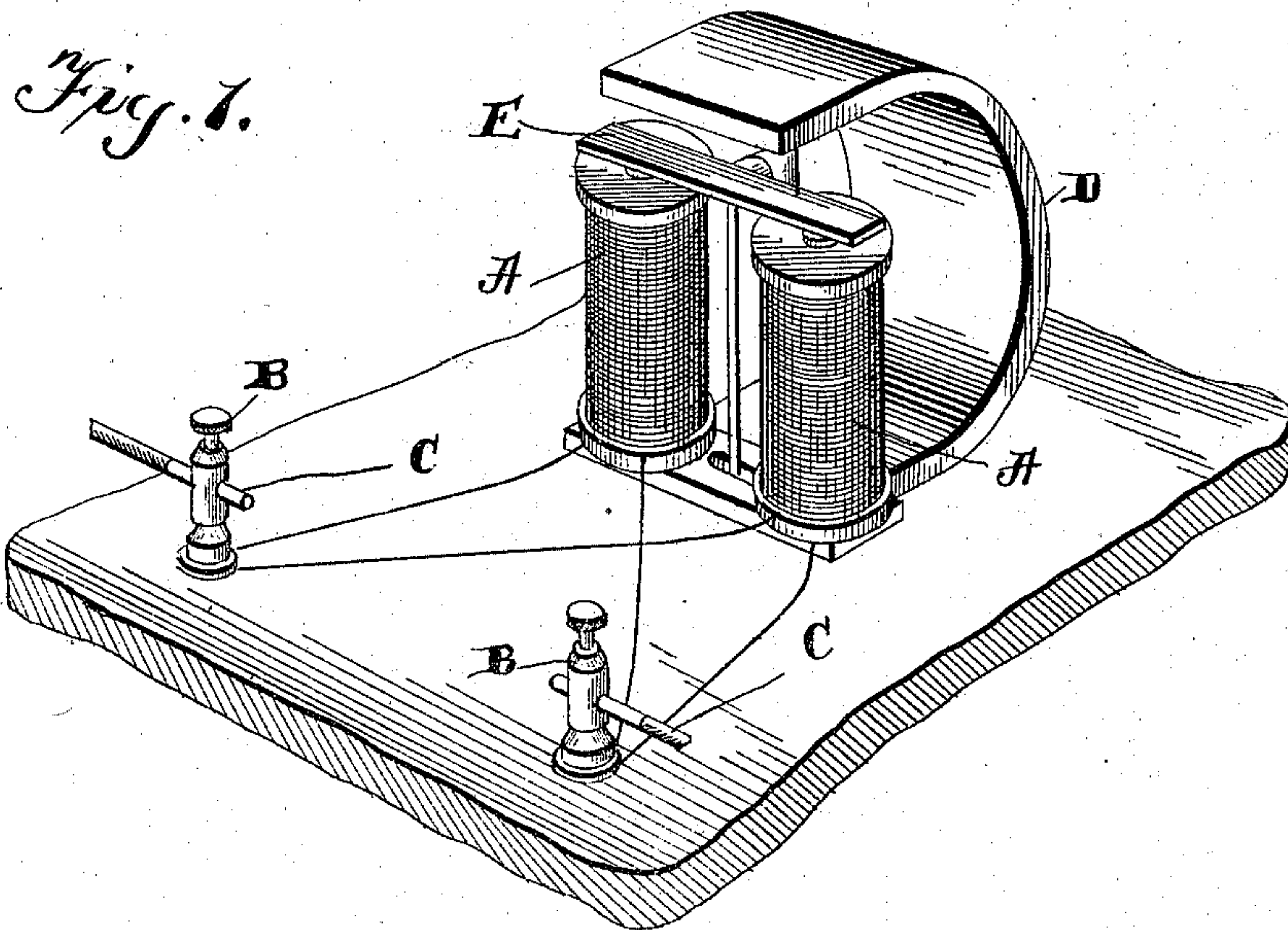


(No Model.)

D. H. FITCH.  
ART OF TELEPHONING.

No. 559,274.

Patented Apr. 28, 1896.



Witnesses  
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# UNITED STATES PATENT OFFICE.

DERICK H. FITCH, OF CAZENOVIA, NEW YORK.

## ART OF TELEPHONING.

SPECIFICATION forming part of Letters Patent No. 559,274, dated April 28, 1896.

Application filed November 29, 1895. Serial No. 570,451. (No model.)

*To all whom it may concern:*

Be it known that I, DERICK H. FITCH, of Cazenovia, in the county of Madison and State of New York, have invented certain new and useful Improvements in the Art of Telephoning; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

This invention pertains to the art of telephoning, and relates more particularly to that class of telephony in which the signaling apparatus is actuated by magneto-electric pulsations.

It is frequently necessary in the operation of telephone-lines to place several stations on the same line or circuit, and very generally the same line serves to convey the magneto-electric signal-operating currents as well as the speech-currents. Electromagnets must be in the circuit for operating the signaling device, and, as is well known, these magnets as heretofore constructed greatly retard the speech-currents which must pass through them. To obviate this difficulty, it has been proposed heretofore to provide a separate path or shunt around the magnets for the telephonic or speech vibrations. Such devices or arrangements, however, have been attended with expense and complication.

In reducing my invention to practical and successful form I have avoided the use of all complicated devices, such as shunts or separate paths, by arranging a non-impeding path or paths through the magnets themselves for the speech-currents.

An electromagnet is made of soft iron, normally non-magnetic, surrounded by coils of insulated wire. When a current of electricity is caused to flow in the wire, it tends to make the iron magnetic. At the beginning of the flow of the current and until the iron becomes magnetic there is a tendency by the magnet to resist the change, and hence the flow of current is somewhat impeded. When the flow in the wire ceases or the circuit is broken, the electromagnet is discharged, and this discharge induces in the wire coil a momentary current in the direction opposite to

that of the charging-current. This is the effect produced upon plain or non-polarized electromagnets. The telephone-ringer or bell-magnet as generally arranged is polarized—that is, the electromagnet, itself non-magnetic, is magnetized by influence by a near-by steel permanent magnet in such a way that in the absence of electric current in the wire both ends or poles of the electromagnet have like polarity, both being N or both S. If a current is sent through the magnet-coils, it will tend to change the poles of the electromagnet to N and S. If too feeble to overcome the influence of the permanent magnet, (ordinary speech-currents are thus feeble,) the same effort will tend to augment the magnetic strength of one pole and diminish the strength of the other pole.

As stated above, when the electromagnet is being charged or its strength augmented, the change is resisted and there is impedance; but when the magnet is discharged or its strength diminished it induces in the wire coil a magneto-electric current in direction opposite to that of a current which would augment its magnetic strength.

In the accompanying drawings, Figure 1 is a perspective view of the magnet and call-bell mechanism, and Fig. 2 a section thereof.

A designates the spools or coils of the electromagnet, which are connected in multiple or duplicate from post B in the main line C. The permanent magnet is indicated by D, while E represents the armature, and F the call-bells. Now by connecting the magnet spools or coils in duplicate or multiple, as here shown, instead of in series, as is now ordinarily done, two separate paths are presented to speech-currents regardless of their direction at posts B.

In operation as a call or signaling device actuated by magneto-electric currents the arrangement operates practically the same as those heretofore and now commonly used. The signaling-current stops and then the magnet resumes the polarized condition. Then come the speech currents or vibrations. These as now generally used are alternations of great rapidity, which, while not strong enough to overcome the influence of the permanent magnet, yet have a tendency to this effect. They tend to increase the magnetic strength



of one pole, while the strength of the other pole is diminished in its efforts to obtain opposite polarity to the pole first mentioned. Now in the first pole mentioned, in which the  
 5 tendency is to augment its strength, the change is resisted and there is impedance; but in the case of the pole reducing in strength the magnet is discharging and there is induced in the wire coil surrounding said pole  
 10 a magneto-electric current in direction opposite to that of a current which would augment its magnet strength, and hence in the same direction as the speech-current, therefore in  
 15 unison with it, and instead of being impeded the said current is aided. Thus telephonic currents approaching in either direction will encounter the divided circuit at posts B and will of course take the path leading to the coil of the magnet surrounding that pole  
 20 whose strength is diminished by the said currents. Thus a non-impeding path is furnished and the magnet creates no obstruction. Currents in the opposite direction find a like free path through the other coil in like manner.  
 25 I am aware that it is not new to connect magnet-coils in multiple or duplicate, as the same has been practiced for many years, generally to make low resistance; but the same has not been used in the combination, nor  
 30 under the conditions, nor for the purpose, nor with the knowledge of the new and useful purpose for which I use it. The bells and armature are shown only for the purpose of illustrating a complete signaling or call de-  
 35 vice, and I do not limit myself to any particular arrangement thereof, nor do I limit my

invention to a signal or call device, for the same is useful in aiding speech-currents through electromagnets in telephone-lines regardless of the function of said magnets. 40

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of an electromagnet, an auxiliary mechanism actuated thereby, a per- 45 manent magnet normally polarizing the electromagnet, and a multiple connection between the electromagnet-coils.

2. The combination of a line or circuit, the electromagnet cores and coils, the multiple 50 connection between said coils and the main line or circuit, the permanent magnet normally polarizing the electromagnet, and a signaling device adapted to be actuated by the last-named magnet, substantially as shown 55 and described.

3. The combination of a normally-polarized electromagnet, an auxiliary mechanism actuated thereby, devices for binding the line-terminals, and a multiple connection between the 60 electromagnet-coils and the line-terminals.

4. The combination of a normally-polarized electromagnet, an auxiliary mechanism actuated thereby, and a multiple connection be- 65 tween the magnet-coils and line-terminals.

In testimony whereof I affix my signature in presence of two witnesses.

DERICK H. FITCH.

Witnesses:

ELEN M. GOOGIN,

CHARLES P. MARSHALL.